

not cause any uneasiness or extra expense on this account. For the rest the explorations are highly satisfactory, and the extension southwards of the gault is no disadvantage.

Besides the outcrop of the "craie glauconieuse," which almost corresponds to the outcrop of the gault, the engineers profess to have determined the line between the "craie de Rouen," or lower chalk, and a nodular bed which lies above it. One cannot help feeling doubts as to the possibility of this being done, with any degree of certainty, by the means at their disposal. It is, however, important to fix if possible the breadth of outcrop of one of the beds; because, the thickness being known, we can thus estimate the dip. The soundings, as interpreted by the Commission, show that the dip is greatest near the French coast, and that it gets gradually less towards the English coast. Borings at and near Calais show that the dip there lessens towards the north, and by analogy it may be inferred that towards the proposed tunnel the beds under the sea will also lessen in dip.

It is proposed to continue the soundings further north, with the view of fixing exactly the outcrops of the higher beds of chalk. As the report states, if these attempts are successful we shall know exactly, and not by hypothesis, the geological structure of the strait. We shall know too the geological structure of the bed of the sea better than we now know that of much of the dry land; for no geologist has attempted to trace out all the chalk divisions on either coast; they have been measured in the cliffs, but not mapped in detail inland.

The Commission recommends that a new and larger borehole be put down at Sangatte with the view of testing the water-bearing qualities of the chalk at different levels, and of proving the exact thickness of the chalk. It is proposed to carry the hole through the gault and into the Palæozoic rocks, with the view of testing whether these rocks are absorbent, and capable of carrying off water from the tunnel. The possibility that they may serve this purpose has been suggested by the present writer.\* The Commission proposes to test the point, but observes that it is unlikely to be the case. The Palæozoic rocks yield water near Lille, though they have not done so at Calais and Harwich; this may be because the old rocks are only slightly permeable, and if so they will be only slightly absorbent. It was on this ground that Prof. Prestwich proposed to tunnel through the Palæozoic rocks.

The Commission has examined in great detail the chalk of the French cliffs, and the results of their observations are drawn in a section in this Report. W. Phillips in 1819 published a description of the cliffs on each side of the Channel. So far as his observations go they are exact, and need no correction; later observers having only worked out the beds in greater detail. The Report refers in terms of well-merited praise to this early work of Phillips, but it is slightly in error in stating that English geologists have done nothing since his time. The Geological Survey has been over the ground; the maps are published, and descriptions have been given by Mr. Whitaker. Mr. Dowker has also studied the higher chalk of Kent.

The Report contains a large chart showing the positions of all the soundings, and is further illustrated by sections and diagrams in the text. It is one of the most valuable publications which has yet appeared on this important subject, and is well worthy of the reputation of its distinguished authors.

W. TOPLEY

#### NOTES

It is with great regret that we hear of the death of Mr. R. C. Carrington, F.R.S., whose name is so intimately associated with solar observation, which indeed he was the first to start in this country. His failing health of late years, was no doubt due to his unceasing assiduity. For seven and a quarter

\* Quart. Journ. Science, April 1872.

years scarcely a single day passed that Mr. Carrington did not make an observation on sun-spots. The book which contains these observations, published by Williams and Norgate, partly at the expense of the Royal Society, is one of the astronomical works of which England has good cause to be proud. Up to his death Mr. Carrington was engaged in designing and planning instruments of more than curious construction, which he intended eventually to fit up in his observatory. Before he took up sun-spot observations he constructed charts and a catalogue of the circumpolar stars, into which he introduced the most minute accuracy. The "Redhill Catalogue" will long be consulted by the practical astronomer.

At the meeting of the Royal Society on Thursday last, the following Fellows were appointed Vice-Presidents of the Society for the ensuing year:—Mr. William Spottiswoode, M.A.; Prof. J. Couch Adams, LL.D.; Captain F. J. O. Evans, R.N.; Dr. A. C. Günther, M.A., and Dr. William Pole, C.E.

COUNT SALVADORI, of the Royal Museum of Turin, has recently described in the "Annals of the Civic Museum of Natural History of Genoa," a large new rapacious bird, discovered by the naturalist D'Alberis in New Guinea, which he proposes to call *Harpyopsis novæ Guinææ*. The existence of this bird probably gave rise to the exaggerated report of the enormous "eagles" which were seen during the voyage up an unexplored river in New Guinea, recently published in the *Daily News* (NATURE, vol. xiii., p. 76.)

At Monday's meeting of the Royal Geographical Society the paper read was by Mr. Octavius Stone, on the discovery of the Mai-Kassa or Baxter River, New Guinea. Mr. Stone sailed up the river in the missionary vessel *Ellangowan*, and the account given is essentially the same as that which has already appeared in our journal, though Mr. Stone seems to make no mention of the monstrous bird referred to by Mr. Smithurst (vol. xiii., p. 76.) At the furthest point reached (about 100 miles from the mouth) the Mai-Kassa was ten yards wide, although the depth was still two fathoms. Even so far in the interior it is influenced by four half-tides daily, as when the first waters meet the sea a rebound is caused, so that the second half-tide is of slightly longer duration than the first. The rise of tide at the furthest point is from 3 feet to 4 feet, but its waters are entirely fresh. It is on account of the sluggish motion and continued depth of this river that Mr. Stone believes it may run for another 100 miles into the interior. A boa-constrictor was shot, 15 ft. 3 in. long, having a protuberance in his body 14½ inches in diameter, which, when cut open, proved to be the body of a whole kangaroo only partially digested.

LAST Saturday's meeting at Bristol, under the presidency of the Mayor, in connection with the proposed University College of that city, was quite a successful one. A constitution, sufficiently comprehensive, was adopted, on the basis of which the general committee were empowered to incorporate the college, and to prepare the necessary legal documents. Thus the college may now be regarded as fairly set afloat, and judging from the enthusiasm of the meeting we should think it likely that it will soon be at work. Out of 40,000*l.* which were wanted, 22,000*l.* have been collected mainly in Bristol and neighbourhood; besides which, it is stated, some colleges at Oxford are willing to give 1,000*l.* a year towards University teaching at Bristol. Among those who spoke were Prof. Jowett and the Rev. Mr. Robinson, of New College, Oxford.

We are authoritatively informed that the delay which has this year taken place in the zoological publications of the Linnean Society will not occur again, and has depended on causes over which the zoological secretary has no control, and for which he is not responsible.

PROF. MAX MÜLLER has been elected a Knight of the Order of Maximilian for Science and Art. The election to this Order, as to the Order *pour le mérite*, rests with the Knights themselves, and is confirmed by the King of Bavaria.

OUR letter last week (p. 106) on the late Dr. Stoliczka's collection of mammals was from Major H. H. Godwin-Austen, Deputy Superintendent of the Topographical Survey of India.

WE take the following from the *Poll Mall Gazette*:—In his last book ("Ziele und Wege der heutigen Entwicklungsgeschichte") Prof. Haeckel, the great apostle of Evolutionism in Germany, announces the discovery of the following law:—"In all the magnificent scientific institutes founded in America by Agassiz, the following empirical law, long recognised in Europe, has been confirmed,—viz. that the scientific work of these institutes and the intrinsic value of their publications stand in an inverse ratio to the magnitude of the buildings and the splendid appearance of their volumes." "I need only refer," he adds, "to the small and miserable institutes, and the meagre resources with which Baer in Königsberg, Schleiden in Jena, Johannes Müller in Berlin, Liebig in Giessen, Virchow in Würzburg, Gegenbaur in Jena have not only each advanced their special science most extensively, but have actually created new spheres for them. Compare with these the colossal expenditure and the luxurious apparatus in the grand institutes of Cambridge, Leipzig, and other so-called great universities. What have they produced in proportion to their means?"

IT is stated in communications received by the Scottish Meteorological Society from their observers in Iceland, that the volcanic eruptions continued till the 18th October, but since then no fresh eruptions have been noted. Up to the 4th inst. the weather in Iceland continued to be remarkably mild, little snow had fallen, and frost had been only of occasional occurrence.

The *Times* Naples correspondent, writing under date Dec. 7, gives details concerning the state of Vesuvius, which confirm Prof. Palmieri's prognostication referred to by us in a recent number (p. 94). The mountain is evidently in a state of great internal agitation, and all the circumstances seem to forbode an early eruption. There have been several earthquake shocks recently in Naples and the surrounding region, one of the most alarming being at 3.24 A.M. on the 6th. Prof. Palmieri does not, however, consider Vesuvius to be the centre of the disturbances; he is inclined to place it at Puglia.

A BOMBAY telegram states that a severe shock of earthquake was felt on Sunday last at Lahore and in the Peshawur district. Several lives were lost.

NEWS has been received lately from Gen. Nausouty and one of his friends who are spending the winter on the Pic du Midi, one of the most elevated mountains in the Pyrenean range, for the purpose of registering meteorological phenomena. The temperature of 22° cent. below zero C. was recorded during the recent cold weather. The observers, however, felt no inconvenience, as the interior temperature of the observatory was always kept above + 10° C. Last year this was impossible, and the observers were obliged to give up their task and to return to warmer regions, being almost starved and frozen to death when retreating.

ON December 5, at two o'clock in the afternoon, a slight earthquake was felt at Blidah, province of Algiers; the duration was only two seconds. A great storm was raging.

THE *Gazzetta Medica di Roma*, which has reached its fifth number, is a journal we would commend to the attention of those interested in scientific medicine. It is well conducted and printed, and the original articles seem to us to be of a high class, creditable altogether to Italian medical research.

THE Auckland (New Zealand) *Southern Cross* hears from Taupo that Mount Tongariro is in a high state of activity, throwing stones for a distance of eight miles from the crater. All the springs and geysers in the neighbourhood are in full play, and some wonderful sights may be seen in this extraordinary region.

AT Rotherham the Committee formed in the town to conduct the Science Classes contains the following: a Clergyman of the Established Church holding the rank of Doctor of Divinity, a Unitarian Minister, a Wesleyan Minister, a Primitive Methodist Minister, and an Independent Minister. We do not need to point the moral.

A NEW periodical has been started in Paris, under the title of *Tour de France*. It records excursions within the borders of the French Republic, and contains maps and illustrations. It will do for France what the *Tour du Monde* does for foreign parts, its aim being to remind Frenchmen of the natural resources and beauties of their own land.

IN the beginning of 1876 there will be opened at Paris, in the Champs Elysées Palace, an exhibition, including all the objects relating to the exploitation of railways and electric telegraphs. This exhibition will interfere in no way with the contemplated Electrical Exhibition which is to take place in 1877.

MR. CASELLA, the well-known scientific instrument-maker, has sent us a specimen of a compass which will be a great boon to the many who are ignorant of the difference between the magnetic and the geographical poles, and of the fact that an ordinary compass points to the former and not to the latter, the difference in this country at present being about 19°. The great advantage of Mr. Casella's "unmistakable true north compass," is that it points to the true or geographical north, being corrected for use in the United Kingdom, and capable of adaptation to any locality in any part of the world. It is a card compass of beautiful workmanship, swings with perfect ease, and by means of a black cone on a white ground, the merest tyro can read it. It is made in various sizes, and sold at various prices, and deserves to come into extensive use.

THE projected programme of vegetable products issued by the Commission of the International Horticultural Exhibition, proposed to be held at Amsterdam in 1877, is one of the best, if not the best, we ever remember seeing. It contains a list of fourteen distinct articles, upon each of which information of the fullest description is asked, from a complete set of specimens of any particular plant of economic value through its various species or varieties down to the implements used in the collection or preparation of the product and the books or writings bearing on the subject. In the matter of vegetable fats and oils, as well as in paper materials, large fields of work present themselves, and much matter of great interest may be exhibited. If the exhibition is carried out in accordance with the designs of the projectors it cannot fail to be most successful and interesting.

TWO lectures, suited for a juvenile audience, will be given in connection with the Society of Arts, on Tuesday, January 4, and Tuesday, January 11, by Dr. W. B. Carpenter, F.R.S., on "The Wonders of the Microscope." The lectures will commence at 7 P.M., and will be illustrated by the oxyhydric and electric lights.

A SAD balloon accident occurred at Vincennes, near Paris, on the 8th inst. The balloon *Univers* having started at 11 o'clock in the morning descended with terrific force thirty-five minutes later from an altitude of 1,000 feet. The balloon was in charge of Eugene Godard, one of the most experienced French aeronauts. Eight persons were on board, amongst whom were Col. Laussedat and some officers who had made the ascent for topographical



purposes. Four persons were injured and the others experienced severe bruises. The real cause of the catastrophe is to be investigated officially by M. Giffard, the celebrated French engineer. At present it is supposed that the band of india-rubber which acts as a spring gave way under influence of the frosty weather.

THE Italian Geographical Society (the *Daily News* Roman correspondent telegraphs) held its first monthly meeting of the winter session on Sunday. Capt. Barrattieri read the report of the Society's expedition to the Tunisian Sahara last June. It gave interesting details of the journey to Gabes, to the Island of Gerba, and to other islands, described the country minutely, and proved the impossibility of the French project for connecting the Sahara with the Mediterranean by canal. The next paper, that of Deputy Caperio, on the latest explorations of Lake Victoria, dwelt on the importance of investigating the sources of the Nile between the mountains parallel to the coast and Lake Victoria. This was the task of the Italian expedition.

In illustration of some remarks in the address of the president, Mr. H. R. Robson, of the Scottish Institution of Engineers and Shipbuilders, the number of the *Transactions* of that Society just published contains a large and carefully executed plate exhibiting a section of the Sub-Wealden bore-hole to the depth of 940 feet.

No. 166 of the *Notizblatt des Vereins für Erdkunde zu Darmstadt und des Mittelrheinischen geologischen Vereins* contains a detailed résumé of the meteorological observations made at Darmstadt during 1874, accompanied with a neat and cleanly constructed diagram showing the daily and monthly results; and also the maximum and minimum temperatures, rainfall, and fog at six stations, during September 1875, in the Grand Duchy of Hesse. Among the many points detailed in the summary for Darmstadt may be noted the dates of the last and the first snow in the course of the year, the last and first frost, the last and first frost-day, mean temperature being  $32^{\circ}$  or lower; the number of frost-days each month, and of summer-days, temperature being  $77^{\circ}$  or higher, and the particular days on which thunder and other weather-phenomena occurred. From November to June the ozone was greatly in excess during the night, but during the other months the excess occurred during the day. Among other matters, there is an interesting table of the mortality during September last from various diseases, at thirteen towns in the Grand Duchy. The deaths from diarrhoea alone, which amounted to sixty-two, were a sixth of the whole. This high diarrhoea death-rate, which is three times greater than that of London during the same season, and the unequal manner in which these deaths, as well as deaths from phthisis, convulsions, and brain diseases, are distributed among the thirteen towns, suggest the desirableness of an inquiry into their sanitary conditions.

At recent meetings of the Executive Committee of the British Pharmaceutical Conference, grants amounting in all to 75*l.*, were made to a number of chemists for the purpose of obtaining material to enable them to carry on scientific researches into the nature and properties of certain substances used in pharmacy.

THE additions to the Zoological Society's Gardens during the past week include a Yellow-fronted Amazon (*Chrysotis ochrocephala*) from Demerara, presented by Mrs. Sproston; a Tree Sparrow (*Passer montanus*), two Mountain Linnets (*Linaria flavirostris*), European, purchased; a West African Python (*Python seba*) from West Africa, presented by Mr. W. H. Berkeley.

At the annual meeting on the 4th inst. of the Huddersfield Naturalists' Society, the Secretary read a satisfactory report. The number of members is 134, the finances are in a flourishing condition, and during the past year twenty-two papers have been read.

### ON SOME PROPERTIES OF GALLIUM

IN a communication just made to the French Academy, M. Lecoq de Boisbaudran states that he has succeeded, after considerable labour, in obtaining salts of gallium sufficiently pure to give, in addition to the gallium spectrum, only faint traces of the zinc lines Zn  $\alpha$  144.62 and Zn  $\gamma$  150.05.

After adding a few facts regarding mixtures of gallium and zinc, he proceeds to examine certain reactions of the pure salts.

1. The electric spectrum of chloride of gallium, a little concentrated, is very brilliant. The line 417 is much brighter than the line 404. The author did not observe any other line attributable to gallium; there certainly are none of notable intensity, under the conditions. The colour of the spark in chloride of gallium is a beautiful clear violet.

2. In the gas flame he got only the line Ga  $\alpha$  417, and very faint and fugitive, even with a salt which gave a brilliant electric spectrum.

3. The chloride and the sulphate of Ga are precipitated by  $\text{NH}_3$ , but the precipitate is redissolved, in great part, in an excess of  $\text{NH}_3$ . Taking up with HCl the portion not dissolved by  $\text{NH}_3$ , and recommencing the operation, all the Ga is promptly obtained in ammoniacal solution.

4. An ammoniacal solution of sulphate or chloride of Ga is precipitated in the cold or hot state by an excess of acetic acid. The liquor must be extremely diluted.

5. The chloride and the sulphate of Ga are not precipitated in the cold state by the acid acetate of ammonia, but the reaction takes place on heating.

6. The sulphate of Ga is soluble in a 60 per cent. alcohol solution.

8. A salt was obtained which the author believes to be ammonio-gallic alum; though, in default of sufficient quantity, he was unable to analyse it or measure the angles.

9. The alum of Ga is soluble in cold water, but, on heating, the salt is decomposed, and the liquor becomes greatly troubled.

10. This alum is not decomposed in the hot state by water with addition of acetic acid.

11. It crystallises very easily in cubes and octahedra, presenting exactly the aspect of ordinary alum; its solution, evaporated under the microscope, also presents the characteristic changes of known alums.

12. The crystals do not act on polarised light (between two Nicols giving extinction).

13. A small crystal was kept some time under a layer of water, then transferred to a slightly supersaturated solution of aluminio-ammoniacal alum; it immediately increased in size, and caused the crystallisation of the liquor.

14. With ammonia in excess, the alum of Ga behaves like the other salts of this metal; a portion of the oxide is precipitated, the other portion remains in solution.

15. The very acid solution of  $\text{Ga}_2\text{Cl}_6$  is precipitated by the yellow prussiate.

16. The ammoniacal solution of sulphate of Ga is decomposed by the voltaic current. Metallic gallium is deposited on the platinum plate serving as negative electrode. The positive electrode is covered, at the same time, with a whitish pellicle, which is easily detached from the platinum, and is insoluble in a large excess of  $\text{NH}_3$ . In a first operation 1.6 mgr. of Ga were deposited in 4h. 30m. on a platinum plate of about 185 square millimetres surface. The surface of the positive electrode was about 877 sq. mm. The battery consisted of five bichromate couples (zincs: 17 cm.  $\times$  10 cm.) coupled in tension. The author presented to the Academy a specimen weighing 3.4 mgr.; it was deposited in 5h. 40m. on a surface of about 123 to 124 sq. mm. The positive electrode 877 sq. mm.; the current furnished by ten bichromate elements (as above) coupled in tension.

17. Electrolytic gallium forms a very adherent layer; it is hard; it is polished with difficulty by friction with an agate burnisher. A better polish is obtained by strong compression under the burnisher; the metal thus acquires great brightness, and appears whiter than platinum. When the electric current and the relative dimensions of the electrodes are properly regulated, the gallium presents a beautiful dull surface of silvery white, finely granulated, and interspersed with small brilliant points, which the microscope shows to be crystals.

18. Gallium, deposited on a platinum plate, is not much oxidised during washing in cold or boiling water, nor on being dried in free air raised to about  $200^{\circ}$ . It decomposes water acidulated with HCl in the cold state, and more rapidly in the hot state, with a brisk liberation of hydrogen.